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Ying-Qing Xu, Yanyun Chen, Stephen Lin, Hua Zhong, Enhua Wu, Baining Guo, Heung-Yeung Shum

August 2001 **Proceedings of the 28th annual conference on Computer graphics and interactive techniques**

Full text available: pdf(29.02 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We present a method for efficient synthesis of photorealistic free-form knitwear. Our approach is motivated by the observation that a single cross-section of yarn can serve as the basic primitive for modeling entire articles of knitwear. This primitive, called the *lumislice*, describes radiance from a yarn cross-section based on fine-level interactions — such as occlusion, shadowing, and multiple scattering — among yarn fibers. By representing yarn as a sequence of identical ...

Keywords: image-based rendering, knitwear, parametric surfaces, photorealistic rendering, transparency blending

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We present a method for efficient synthesis of photorealistic free-form knitwear. Our approach is motivated by the observation that a single cross-section of yarn can serve as the basic primitive for modeling entire articles of knitwear. This primitive, called the *lumislice*, describes radiance from a yarn cross-section based on fine-level interactions — such as occlusion, shadowing, and multiple scattering — among yarn fibers. By representing yarn as a sequence of identical ...

Keywords: image-based rendering, knitwear, parametric surfaces, photorealistic rendering, transparency blending

2 [Pushing the frontiers: A photometric approach to digitizing cultural artifacts](#)

Tim Hawkins, Jonathan Cohen, Paul Debevec


November 2001 **Proceedings of the 2001 conference on Virtual reality, archeology, and cultural heritage**Full text available: pdf(19.56 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

In this paper we present a photometry-based approach to the digital documentation of cultural artifacts. Rather than representing an artifact as a geometric model with spatially varying reflectance properties, we instead propose directly representing the artifact in terms of its *reflectance field* --- the manner in which it transforms light into images. The principal device employed in our technique is a computer-controlled lighting apparatus which quickly illuminates an artifact from an e ...

Keywords: image-based modeling, lighting, rendering

3 [Session P3: volume visualization I: Interactive translucent volume rendering and procedural modeling](#)


Joe Kniss, Simon Premoze, Charles Hansen, David Ebert

October 2002 **Proceedings of the conference on Visualization '02**Full text available:  [pdf\(37.78 MB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)


Direct volume rendering is a commonly used technique in visualization applications. Many of these applications require sophisticated shading models to capture subtle lighting effects and characteristics of volumetric data and materials. Many common objects and natural phenomena exhibit visual quality that cannot be captured using simple lighting models or cannot be solved at interactive rates using more sophisticated methods. We present a simple yet effective interactive shading model which capt ...

Keywords: procedural modeling, shading model, volume modeling, volume rendering4 The motion dynamics of snakes and worms


Gavin S. P. Miller

June 1988 **ACM SIGGRAPH Computer Graphics , Proceedings of the 15th annual conference on Computer graphics and interactive techniques**, Volume 22 Issue 4Full text available:  [pdf\(6.78 MB\)](#)Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)**Keywords:** animation, deformation, dynamics, elasticity, locomotion, modeling, rendering, simulation, texture5 Anisotropic reflection models

James T. Kajiya

July 1985 **ACM SIGGRAPH Computer Graphics , Proceedings of the 12th annual conference on Computer graphics and interactive techniques**, Volume 19 Issue 3Full text available:  [pdf\(1.65 MB\)](#)Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)**Keywords:** computer graphics, frame mapping, lighting models, raster graphics, surface mapping, texture mapping6 A model for anisotropic reflection

Pierre Poulin, Alain Fournier

September 1990 **ACM SIGGRAPH Computer Graphics , Proceedings of the 17th annual conference on Computer graphics and interactive techniques**, Volume 24 Issue 4Full text available:  [pdf\(3.24 MB\)](#)Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)7 Light scattering from human hair fibers

Stephen R. Marschner, Henrik Wann Jensen, Mike Cammarano, Steve Worley, Pat Hanrahan

July 2003 **ACM Transactions on Graphics (TOG)**, Volume 22 Issue 3Full text available:  [pdf\(15.64 MB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Light scattering from hair is normally simulated in computer graphics using Kajiya and Kay's classic phenomenological model. We have made new measurements of scattering from individual hair fibers that exhibit visually significant effects not predicted by Kajiya and Kay's model. Our measurements go beyond previous hair measurements by examining out-of-plane scattering, and together with this previous work they show a multiple specular

highlight and variation in scattering with rotation about the ...

Keywords: fibers, hair, optical scattering, rendering

8 Session I: Content creation: A lightwave 3D plug-in for modeling long hair on virtual humans

Deborah Patrick, Shaun Bangay

February 2003 **Proceedings of the 2nd international conference on Computer graphics, virtual Reality, visualisation and interaction in Africa**

Full text available:  pdf(2.50 MB) Additional Information: [full citation](#), [abstract](#), [references](#)

Multimedia applications today make use of virtual humans. Generating realistic virtual humans is a challenging problem owing to a number of factors, one being the simulation of realistic hair. The difficulty in simulating hair is due to the physical properties of hair. The average human head holds thousands of hairs, with the width of each hair often smaller than the size of a pixel. There are also complex lighting effects that occur within hair. This paper presents a LightWave 3D plug-in for mo ...

Keywords: explicit model, hair modeling, lightwave, plug-in

9 Heads, faces, hair: A practical model for hair mutual interactions

Johnny T. Chang, Jingyi Jin, Yizhou Yu

July 2002 **Proceedings of the 2002 ACM SIGGRAPH/Eurographics symposium on Computer animation**

Full text available:  pdf(2.41 MB) Additional Information: [full citation](#), [abstract](#), [references](#)

Hair exhibits strong anisotropic dynamic properties which demand distinct dynamic models for single strands and hair-hair interactions. While a single strand can be modeled as a multibody open chain expressed in generalized coordinates, modeling hair-hair interactions is a more difficult problem. A dynamic model for this purpose is proposed based on a sparse set of guide strands. Long range connections among the strands are modeled as breakable static links formulated as nonreversible positional ...

Keywords: collision detection, hair animation, hair rendering, hair-hair' interaction, open chain, static links

10 Comparing interfaces based on what users watch and do

Eric C. Crowe, N. Hari Narayanan

November 2000 **Proceedings of the symposium on Eye tracking research & applications**


Full text available:  pdf(1.69 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

With the development of novel interfaces controlled through multiple modalities, new approaches are needed to analyze the process of interaction with such interfaces and evaluate them at a fine grain of detail. In order to evaluate the usability and usefulness of such interfaces, one needs tools to collect and analyze richly detailed data pertaining to both the process and outcomes of user interaction. Eye tracking is a technology that can provide detailed data on the allocation and shifts of ...

Keywords: eye tracking, interaction log analysis, speech-controlled interface, visualization

11 Rendering fur with three dimensional textures

J. T. Kajiya, T. L. Kay

July 1989 **ACM SIGGRAPH Computer Graphics , Proceedings of the 16th annual conference on Computer graphics and interactive techniques**, Volume 23 Issue 3
 Full text available:  [pdf\(1.55 MB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

12 Image-based reconstruction of spatial appearance and geometric detail

Hendrik P. A. Lensch, Jan Kautz, Michael Goesele, Wolfgang Heidrich, Hans-Peter Seidel
 April 2003 **ACM Transactions on Graphics (TOG)**, Volume 22 Issue 2


Full text available:  [pdf\(302.22 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Real-world objects are usually composed of a number of different materials that often show subtle changes even within a single material. Photorealistic rendering of such objects requires accurate measurements of the reflection properties of each material, as well as the spatially varying effects. We present an image-based measuring method that robustly detects the different materials of real objects and fits an average bidirectional reflectance distribution function (BRDF) to each of them. In or ...

Keywords: BRDF measurement, normal map acquisition, photometric stereo, shape from shading, spatially varying BRDFs

13 Image-based transparency and refraction: Acquisition and rendering of transparent and refractive objects


Wojciech Matusik, Hanspeter Pfister, Remo Ziegler, Addy Ngan, Leonard McMillan
 July 2002 **Proceedings of the 13th Eurographics workshop on Rendering**

Full text available:  [pdf\(16.22 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

This paper introduces a new image-based approach to capturing and modeling highly specular, transparent, or translucent objects. We have built a system for automatically acquiring high quality graphical models of objects that are extremely difficult to scan with traditional 3D scanners. The system consists of turntables, a set of cameras and lights, and monitors to project colored backdrops. We use multi-background matting techniques to acquire alpha and environment mattes of the object from mul ...

14 Acquiring the reflectance field of a human face

Paul Debevec, Tim Hawkins, Chris Tchou, Haarm-Pieter Duiker, Westley Sarokin, Mark Sagar
 July 2000 **Proceedings of the 27th annual conference on Computer graphics and interactive techniques**

Full text available:  [pdf\(3.70 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We present a method to acquire the reflectance field of a human face and use these measurements to render the face under arbitrary changes in lighting and viewpoint. We first acquire images of the face from a small set of viewpoints under a dense sampling of incident illumination directions using a light stage. We then construct a reflectance function image for each observed image pixel from its values over the space of illumination directions. From the reflectance functions, we can directl ...

Keywords: facial animation, image-based modeling, rendering and lighting

15 Heads, faces, hair: Head shop: generating animated head models with anatomical structure

Kolja Kähler, Jörg Haber, Hitoshi Yamauchi, Hans-Peter Seidel
 July 2002

Proceedings of the 2002 ACM SIGGRAPH/Eurographics symposium on Computer animation

Full text available:  pdf(9.67 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We present a versatile construction and deformation method for head models with anatomical structure, suitable for real-time physics-based facial animation. The model is equipped with landmark data on skin and skull, which allows us to deform the head in anthropometrically meaningful ways. On any deformed model, the underlying muscle and bone structure is adapted as well, such that the model remains completely animatable using the same muscle contraction parameters. We employ this general techni ...

Keywords: biological modeling, deformations, facial animation, geometric modeling, morphing, physically based animation

16 Integrating shape and pattern in mammalian models

Marcelo Walter, Alain Fournier, Daniel Menevaux

August 2001 **Proceedings of the 28th annual conference on Computer graphics and interactive techniques**

Full text available:  pdf(955.84 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

The giraffe and its patches, the leopard and its spots, the tiger and its stripes are spectacular examples of the integration of a pattern and a body shape. We present an approach that integrates a biologically-plausible pattern generation model, which can effectively deliver a variety of patterns characteristic of mammalian coats, and a body growth and animation system that uses experimental growth data to produce individual bodies and their associated patterns automatically. We use the exam ...

Keywords: animal models, animal patterns, clonal mosaic patterns, growth, integration, natural phenomena, texture synthesis

17 Synthesizing realistic facial expressions from photographs

Frédéric Pighin, Jamie Hecker, Dani Lischinski, Richard Szeliski, David H. Salesin

July 1998 **Proceedings of the 25th annual conference on Computer graphics and interactive techniques**

Full text available:  pdf(276.04 KB) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

Keywords: facial animation, facial expression generation, facial modeling, morphing, photogrammetry, view-dependent texture-mapping

18 Three-dimensional object recognition

Paul J. Besl, Ramesh C. Jain


March 1985 **ACM Computing Surveys (CSUR)**, Volume 17 Issue 1

Full text available:  pdf(7.76 MB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)



A general-purpose computer vision system must be capable of recognizing three-dimensional (3-D) objects. This paper proposes a precise definition of the 3-D object recognition problem, discusses basic concepts associated with this problem, and reviews the relevant literature. Because range images (or depth maps) are often used as sensor input instead of intensity images, techniques for obtaining, processing, and characterizing range data are also surveyed.

19 A morphable model for the synthesis of 3D faces

Volker Blanz, Thomas Vetter

July 1999 **Proceedings of the 26th annual conference on Computer graphics and interactive techniques**Full text available:  pdf(2.76 MB)Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)**Keywords:** computer vision, facial animation, facial modeling, morphing, photogrammetry, registration**20** A virtual environment and model of the eye for surgical simulation

Mark A. Sagar, David Bullivant, Gordon D. Mallinson, Peter J. Hunter

July 1994 **Proceedings of the 21st annual conference on Computer graphics and interactive techniques**Full text available:  pdf(667.19 KB)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#) ps(8.17 MB)

An anatomically detailed 3-D computer graphic model of the eye and surrounding face within a virtual environment has been implemented for use in a surgical simulator. The simulator forms part of a teleoperated micro-surgical robotic system being developed for eye surgery. The model has been designed to both visually and mechanically simulate features of the human eye by coupling computer graphic realism with finite element analysis. The paper gives an overview of the system with e ...

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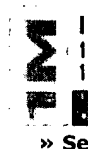
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Yanyun Chen; Lin, S.; Hua Zhong; Ying-Qing Xu; Baining Guo; Heung-Yeung Shum;

Visualization and Computer Graphics, IEEE Transactions on , Volume: 9 , Issue 1 , Jan.-March 2003

Pages:43 - 55

[\[Abstract\]](#) [\[PDF Full-Text \(2689 KB\)\]](#) **IEEE JNL**
2 Modeling and visualization of knitwear

Groller, E.; Rau, R.T.; Strasser, W.;

Visualization and Computer Graphics, IEEE Transactions on , Volume: 1 , Issue 4 , Dec. 1995

Pages:302 - 310

[\[Abstract\]](#) [\[PDF Full-Text \(1420 KB\)\]](#) **IEEE JNL**
3 Computer integrated manufacture within the knitted garment/textile industry

Paterson, A.; Morse, M.;

Factory 2000, 1992. 'Competitive Performance Through Advanced Technology Third International Conference on (Conf. Publ. No. 359) , 27-29 Jul 1992

Pages:240 - 245

[\[Abstract\]](#) [\[PDF Full-Text \(516 KB\)\]](#) **IEEE CNF**
4 Measurement of garment dimensions using machine vision

Norton-Wayne, L.; Mackellar, A.; Nicklin, C.;

Image Processing and its Applications, 1989., Third International Conference on , 18-20 Jul 1989

Pages:197 - 201

[\[Abstract\]](#) [\[PDF Full-Text \(304 KB\)\]](#) **IEE CNF**

**5 Automated stripping-a missing link in computer integrated manufac
for the clothing industry**

Paterson, A.; Kirby, N.; Hallberg, G.;

Factory 2000, 1992. 'Competitive Performance Through Advanced Technology
Third International Conference on (Conf. Publ. No. 359) , 27-29 Jul 1992

Pages:246 - 251

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Image Processing, 1999. ICIP 99. Proceedings. 1999 International Conference on , Volume: 3 , 24-28 Oct. 1999

Pages:593 - 596 vol.3

[\[Abstract\]](#) [\[PDF Full-Text \(372 KB\)\]](#) **IEEE CNF**
2 Realistic rendering and animation of knitwear*Yanyun Chen; Lin, S.; Hua Zhong; Ying-Qing Xu; Baining Guo; Heung-Yeung Shum;*

Visualization and Computer Graphics, IEEE Transactions on , Volume: 9 , Issue 1 , Jan.-March 2003

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